

The costs of screening and brief intervention for risky alcohol use

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Zarkin, G. A., Bray, J. W., Davis, K. L., Babor, T. F., & Higgins-Biddle, J. C. (2003). The costs of screening and brief intervention for risky alcohol use. *Journal of Studies on Alcohol*, 64(6), 849–857.

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Abstract:

Objective: The purpose of this study was to estimate provider-incurred costs of alcohol screening and brief intervention (SBI) for risky drinking as implemented in four managed care organizations (MCOs) participating in the Cutting Back project implemented by the University of Connecticut Health Center. **Method:** Each MCO provided two comparable primary care clinics in which two different SBI models were implemented: the "Practitioner" (P) model and the "Specialist" (S) model. Risky drinkers were identified based on responses to a health appraisal form. They were administered the AUDIT to determine an appropriate intervention. Using data collected from these sites, we separately estimated start-up and ongoing implementation costs of the intervention. **Results:** SBI start-up costs per MCO ranged from approximately \$86,000 to \$115,000 across the four study MCOs. Across all four study MCOs, the estimated median ongoing implementation cost of administering the health appraisal was \$0.25 per patient appraised, and the estimated median cost of screenings was \$0.42 per patient screened. The estimated median cost of performing the brief intervention across the study MCOs was \$2.59 per patient receiving the intervention in the S clinics and \$3.43 per patient receiving the intervention in the P clinics. Labor costs dominated start-up and ongoing implementation. Technical assistance costs accounted for a significant proportion of start-up costs. Implementation in the S model is less costly than in the P model, largely because of the S model's use of less expensive nonphysician labor. **Conclusions:** Our analysis suggests that the cost of SBI is modest, and MCOs may want to consider adopting SBI as an alcohol use prevention tool. Although our results suggest that the S model is less costly than the P model, clinic-level implementation factors may affect the relative costs of the S versus P models.

Keywords: alcohol dependence | screening and brief intervention (SBI) | managed care organizations | costs

Article:

***Note: Full text of article below

The Costs of Screening and Brief Intervention for Risky Alcohol Use*

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ministering the health appraisal was \$0.25 per patient appraised, and the estimated median cost of screenings was \$0.42 per patient screened. The estimated median cost of performing the brief intervention across the study MCOs was \$2.59 per patient receiving the intervention in the S clinics and \$3.43 per patient receiving the intervention in the P clinics. Labor costs dominated start-up and ongoing implementation. Technical assistance costs accounted for a significant proportion of start-up costs. Implementation in the S model is less costly than in the P model, largely because of the S model's use of less expensive nonphysician labor. *Conclusions:* Our analysis suggests that the cost of SBI is modest, and MCOs may want to consider adopting SBI as an alcohol use prevention tool. Although our results suggest that the S model is less costly than the P model, clinic-level implementation factors may affect the relative costs of the S versus P models. (*J. Stud. Alcohol* 64: 849-857, 2003)

ALCOHOL ABUSE was estimated to cost the United States \$184.6 billion in 1998 (Harwood et al., 2000). The enormous social costs of alcohol abuse make it a major concern among policy makers and health care professionals. However, estimates based on the 1992 National Longitudinal Alcohol Epidemiologic Survey (NLAES) suggest that alcoholics constitute only 5% of the adult American population. NLAES estimates further suggest that 20% of the adult population drink in a way that creates a risk of harm to themselves or others (Association for Health Services Research, 1996). Such "risky drinkers" are defined as people who are not alcohol dependent but who drink above safe limits on a regular basis or drink more than is safe on particular occasions. Because there are so many more risky drinkers than alcoholics, a significant proportion of alcohol-related problems may be attributed to risky drinkers (Institute of Medicine, 1990).

Recent research has developed a simple procedure for identifying and managing risky drinking among adults:

screening and brief intervention (SBI). SBI entails a standardized self-report screening test used to identify individuals who drink above recommended guidelines. An intervention consisting of low-intensity, short-duration counseling is then delivered to those individuals identified as risky drinkers. The cumulative evidence of SBI research suggests that brief interventions are effective in reducing alcohol use among most populations at risk when implemented in a variety of settings (Bien et al., 1993; Fleming et al., 1997; Moyer et al., 2002; Ockene et al., 1999; Wallace et al., 1988; Wilk et al., 1997). For this reason, SBI has also been ranked as one of the seven most cost beneficial prevention services (Coffield et al., 2001).

Although numerous studies have shown SBI to be effective in reducing alcohol consumption among risky drinkers, it has not been widely adopted as a standard practice. One possible reason for this may be that potential providers of SBI lack information about the costs of implementing and maintaining it. Only a few (Broskowski and Smith, 2001; Fleming et al., 2000; Wutzke et al., 2001) studies have estimated the costs of brief intervention programs for risky alcohol use, especially in the context of large-scale managed care organizations (MCOs).

Although the studies noted above provide useful cost estimates from the individual provider perspective, they do not estimate costs separately for the distinct start-up and ongoing implementation phases that characterize a typical

Received: January 23, 2003. Revision: August 21, 2003.

*This article was supported by a contract from the University of Connecticut Health Center for the Cutting Back project (contract no. 63727302), which was funded by the Robert Wood Johnson Foundation.

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SBI program, nor do they provide detailed information on resources used from the MCO perspective. Existing studies also do not estimate the costs of technical assistance required to establish and assure quality in an SBI program. Although no studies have estimated these costs explicitly, Wutzke et al. (2001) addressed technical assistance costs indirectly by estimating SBI costs with varying levels of technical assistance. The costs of such assistance are an important factor in the provider's decision to implement SBI. Analyses presented in this article extend Wutzke et al.'s approach by estimating technical assistance costs as a separate cost component.

Cutting Back

Cost estimates presented here were developed as part of a five-site research project (Cutting Back) designed to evaluate the application of SBI in primary care settings of MCOs. Only four of the five MCOs fully implemented Cutting Back; hence, estimates presented apply to only those four MCOs. The four MCOs for which SBI costs are estimated are distinguished by their diverse geographic locations: the Midwest, Northeast, West and Southwest United States.

MCOs participating in Cutting Back typically provided two comparable primary care clinics in which different models of SBI were implemented. One clinic implemented the "Practitioner" (P) model, and the other clinic implemented the "Specialist" (S) model. In the P clinics, 61% of interventions were delivered by physicians, and the remaining 39% were delivered by physician assistants and nurse practitioners. Interventions performed in the P clinics were usually delivered as part of a patient's routine visit. In the S clinics, SBI was delivered by mid-level professionals, such as health educators and nurses. All interventions performed in the S clinics were delivered by a group of designated intervention staff who performed the intervention either before or after patients saw their practitioner. A third clinic from each MCO served as a comparison or control clinic, but it did not deliver interventions. Clinics operated under project funding for 6 months or until sufficient patient volume was achieved.

Clinics involved in Cutting Back administered a health and lifestyles questionnaire (health appraisal or prescreening instrument) to all patients age 18 and over on their first visit to the clinic during the study period. The instrument identified patients who were at-risk drinkers. Patients in the intervention clinics who scored positive on the health appraisal were given a modified version of the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993). Scores obtained on the AUDIT were used to indicate an appropriate intervention.

Interventions consisted of approximately 3 to 5 minutes of brief advice with an accompanying brochure or a longer self-help manual. These brief interventions focused on ex-

pressions of concern to help patients recognize the impact of their drinking, set guidelines and goals for lowering risk and empowering patients to change their drinking behaviors. Patients identified by the AUDIT as alcohol dependent were referred to their MCO's alcohol specialty service for diagnostic assessment and treatment. Patients in the control clinic (including those identified as risky drinkers) received neither the AUDIT nor the brief intervention; instead, they received standard care, which generally implies no intervention.

Method

In this article, we focus on the costs associated with start-up and ongoing implementation of SBI in the study MCOs. Cutting Back project activities performed by the University of Connecticut Health Center (UCHC) and the MCOs fall into four categories: administrative, research, development, and SBI implementation. Cost instruments were developed to isolate the implementation costs from the other cost categories. Implementation activities are associated with the actual conduct and implementation of SBI. They include both start-up and ongoing implementation activities. Start-up activities were required to initiate SBI and were generally performed before the official intervention start date. Ongoing activities were required to maintain SBI once the intervention program was operational (e.g., health appraisal, screening, and the brief intervention itself).

Cost data collection

Data on start-up activities were collected from both MCO sites and UCHC. Start-up activities include the training of MCO staff, other planning and administrative activities related to implementation, and UCHC's provision of technical assistance. To collect data on training costs incurred by the MCOs, we used records compiled by the UCHC study team during SBI training sessions to gather information on the MCO labor, space, and media resources devoted to training. To collect data on MCO-incurred start-up costs not related to training, we developed a cost instrument for the clinic coordinator at each MCO. This cost instrument collected information on the salaries of MCO staff and the amount of time they spent on nontraining activities, such as developing procedures for administering the health appraisal, AUDIT and brief intervention.

Because UCHC administered SBI training sessions, data were also collected on UCHC resources devoted to training at each MCO. To collect these data, we developed a cost questionnaire for UCHC staff that gathered information on UCHC labor and travel resources devoted to training. Because each MCO participated in Cutting Back at the request of UCHC, the MCOs were not asked to bear the UCHC-incurred costs of training. However, we included

these costs in the MCO cost perspective because they are an important element of establishing the intervention program and are likely to be incurred by a typical MCO or practice attempting to implement SBI outside of a research project.

In addition to administering training at each MCO, UCHC provided MCO staff with technical assistance during start-up to ensure that SBI could be fully integrated into the daily routine of each clinic once the ongoing implementation phase began. Some technical assistance was also provided during ongoing implementation, the bulk of which occurred at the beginning of the ongoing phase and entailed activities largely aimed at making SBI operational. Assuming that MCOs would not need technical assistance after a certain point, technical assistance costs may be considered a one-time cost associated with start-up, rather than a variable cost associated with ongoing implementation. Thus, all technical assistance costs incurred by UCHC during ongoing implementation were included in technical assistance costs incurred during start-up. To collect data on UCHC technical assistance costs, the UCHC cost questionnaire noted above also gathered information on UCHC labor, travel, space, media, and other resources devoted to providing technical assistance related to implementing SBI.

To collect data on ongoing implementation costs, we developed a cost instrument completed by MCO clinical staff that gathered information on their job title and the number of minutes it usually took to administer the health appraisal, screen (AUDIT) and intervention. These activities were performed by only a small number of staff in each clinic (e.g., typically only six staff persons performed the health appraisal, four staff persons performed screening and fewer than 10 staff persons performed the brief intervention). Therefore, we used the median number of minutes spent on each SBI activity across staff within a clinic. Time spent on research-related administrative tasks was excluded from these estimates.

The cost instrument also collected information on where health appraisals, screenings and interventions were usually performed (e.g., reception area, examining room, private office), as well as information on the media costs associated with ongoing implementation. To collect the media costs of SBI, we gathered information from the UCHC study team on the number and production costs of health appraisal, screening and intervention materials used at each site.

Estimating start-up costs

Start-up costs comprised the MCO- and UCHC-incurred costs of training, other nontraining activities and UCHC technical assistance. These costs are one-time costs and are not associated with ongoing implementation. Because many of the start-up activities performed by the MCO and UCHC

affected both the S and P clinics, it was not possible to separate start-up costs by clinic type (S or P), although we expect start-up costs to be less in the S clinics because of lower salaries for specialists compared with higher salaries for physicians in the P clinics.

Training costs. MCO-incurred training costs consisted of the labor, space, and media resources (training manuals) devoted to training activities during SBI start-up. The MCO labor costs of training equal the product of the number of individuals from each MCO who attended training, their hourly wage and the number of hours they spent in training. Hourly wages were either directly available or were estimated by dividing annual salaries (provided by clinic coordinators at each MCO) by 2,000 hours.

At each MCO, training took place in a meeting room occupied by multiple staff. Because the size of training areas varied across MCOs, we assumed a common square footage per capita (15 square feet) to estimate the space used by each trainee (North Carolina Office of State Fire Marshall, 2002). The MCO-incurred space costs of training equal the product of the number of individuals who attended training, the hourly per capita cost of space and the number of training hours delivered at each MCO site. Hourly per capita space costs were calculated by multiplying the hourly price of a square foot of space by 15 square feet. MCO-specific prices of a square foot of space were collected from the clinic coordinators.

The MCO-incurred media costs of training equal the costs of participant training manuals. Assuming that one training manual was distributed to each MCO staff person who attended training, the media costs of training are calculated as the product of the unit production cost of a training manual (\$7.73) and the number of staff who attended training.

UCHC-incurred training costs consisted of the labor and travel expenses incurred by UCHC in providing training to staff at each MCO. UCHC training expenses were collected directly from cost totals reported by the UCHC study team.

Other start-up costs. Other start-up costs included the costs of labor devoted to nontraining activities, such as developing a clinic implementation plan. These labor costs were calculated by adding the product of hourly wages and time spent by staff on nontraining start-up activities. Other start-up costs for the West MCO included the costs of implementing a computerized system of health appraisal and screening. Individuals visiting the West MCO clinics were given a small computer device that automatically presented, scored and saved patient health appraisal and AUDIT responses. If an individual scored positive for risky drinking on the health appraisal, the computer program proceeded directly with screening. The West MCO incurred programming (labor) and equipment expenses to implement this procedure.

UCHC technical assistance costs. Start-up costs also included the costs of technical assistance provided by UCHC

to each MCO. Technical assistance costs included the costs of UHC resources devoted to nontraining activities, such as assistance with logistical and other implementation efforts required to integrate SBI into the daily routine of each clinic. They also included labor, travel, space and media expenses related to nontraining start-up activities.

Costs of technical assistance labor were calculated using the annual salary (including fringe) of UHC employees and consultants who provided technical assistance to the MCOs. Travel costs reflect the travel expenses incurred by UHC employees and consultants while providing technical assistance to MCO staff. To estimate UHC space costs related to technical assistance, we used the average lease rate for a Class A suburban office in the Hartford, Connecticut, metropolitan area (\$17.50 per square foot) (Metro Hartford Chamber of Commerce, 2003). UHC media expenses related to technical assistance included the costs of developing training manuals, presentation materials, videos and other materials. Other UHC technical assistance expenses incurred during start-up were the cost of supplies, telephone expenses and computer software. Technical assistance costs not attributable to a specific MCO (such as computer software) were distributed among all MCOs in proportion to the amount of technical assistance labor provided by UHC to each MCO.

Estimating ongoing implementation costs

Ongoing implementation costs comprised the costs of health appraisal, screening, and delivery of the intervention. With the exception of the Northeast MCO, we present cost estimates separately for the S and P clinics, and we present the median cost as the summary measure of costs. The Northeast MCO did not implement SBI in an S clinic; hence, cost estimates for the Northeast MCO are presented for the P clinic only. The Midwest MCO implemented SBI in an additional S clinic; therefore, S clinic estimates presented for the Midwest MCO represent the arithmetic mean across the two S clinics.

Health appraisal and screening. Health appraisal and screening costs were the costs of MCO resources (labor, space and media) devoted to administering the health appraisal and screen. The labor cost of health appraisal and screening per patient was estimated as the product of the number of minutes spent by MCO staff administering the health appraisal and screen to each patient and the wage per minute of staff performing these activities. Because we estimated costs from the MCO perspective, patients' time spent completing the health appraisal and screen was not considered.

Health appraisals and screenings were performed in reception areas while patients waited to see their physicians. Space costs were the space occupied by the patient and receptionist who administered and scored the health ap-

praisal. To estimate space costs, we used a standard estimate of the square footage occupied by the patient and receptionist (15 square feet per person). The space costs of health appraisals and screenings per patient were calculated as the product of the per capita cost of space per minute and the number of minutes spent on health appraisals and screenings per patient.

Media costs for health appraisals and screenings were the costs of photocopied forms. UHC supplied one health appraisal form and one screening form to each clinic, and staff photocopied the forms as needed. Because health appraisal and AUDIT forms were each one page in length, the media costs of each per patient were calculated as the cost of a single page photocopy (\$0.05).

The Cutting Back protocol implemented the same appraisal and screening methods in both the S and P clinics. Thus, the costs of appraisal and screening should be the same in the S and P clinics, but, because of differences in how clinics actually implemented the protocol and measurement error in recording the time estimates, there are differences in estimated costs between the S and P clinics. To minimize the impact of these two factors and to better represent expected costs, we report the median costs of appraisal and screening across all clinics. We used the median rather than the arithmetic mean because we had only five estimates each for appraisal and screening and the median better represents the typical response.

Intervention. Intervention costs were the costs of resources (labor, space and media) devoted to delivering the brief intervention to patients identified as risky drinkers. Labor costs per intervention were estimated as the product of the number of minutes spent on interventions per patient and the wage per minute of staff who performed interventions.

Interventions took place in an examining room. Space costs per intervention were estimated as the product of the size of a clinic's examining room (in square feet), the average number of minutes spent on the intervention and the cost of space per square foot per minute.

Media costs for interventions were the costs of brochures and self-help manuals distributed to patients who received the intervention. Patients identified as Zone I risky drinkers (AUDIT score <16) received the SBI brochure. Patients identified as Zone II risky drinkers (AUDIT scores ≥ 16) received a comprehensive self-help manual instead of the brochure. The production cost of an SBI brochure and self-help manual was \$0.39 and \$0.71 per unit, respectively. We used the percentage of risky drinkers at each MCO who scored in the Zone I and Zone II categories of the AUDIT (96% and 4% across the four MCOs, respectively) to calculate a weighted average of media costs per intervention.

Because the Cutting Back protocol was specifically designed to implement and test the impact of two alternative

TABLE 1. Start-up costs by MCO site (2001\$)

Cost component	MCO site			
	Midwest	Northeast	West	Southwest
Training costs				
MCO training costs				
Labor	\$5,114.34	\$2,985.90	\$12,421.50	\$3,478.44
Space	\$95.04	\$19.98	\$151.20	\$44.28
Participation manual	\$510.18	\$286.01	\$541.10	\$316.93
UCHC training costs	\$21,136.67	\$16,701.41	\$20,973.51	\$16,598.29
Other (nontraining) MCO costs				
Labor	\$10,761.21	\$643.71	\$22,065.60	\$259.07
Equipment	—	—	\$10,870.00	—
UCHC technical assistance	\$75,566.79	\$67,673.50	\$47,491.53	\$65,151.61
Total start-up costs per MCO site	\$113,184.23	\$88,310.51	\$114,514.44	\$85,848.62
Avg. total start-up costs per clinic	\$37,728.08	\$88,310.51	\$57,257.22	\$42,924.31

intervention designs, median intervention costs across all MCOs are reported separately for the S and P clinics.

Results

Cost estimates presented in Tables 1 through 3 are expressed in real 2001 dollars based on the consumer price index for all urban consumers. Table 1 reports estimates of total start-up costs for each MCO (a detailed resource utilization table is available from the first author upon request). Total start-up costs ranged from \$85,849 to \$114,514 per MCO. Total start-up costs for the Midwest and West MCOs were somewhat high relative to the Northeast and Southwest MCOs. The larger start-up costs incurred by the Midwest MCO are primarily due to difficulties in initiating the SBI program and implementing the SBI in two S clinics

rather than one, which required an additional training session. The larger start-up costs incurred by the West MCO are primarily due to the MCO labor and equipment expenses required to implement the computerized system of health appraisal and screening discussed above. Costs of technical assistance dominated SBI start-up, but less comprehensive assistance than that provided by UCHC for this study may prove to be equally effective in real-world applications of SBI (Babor and Higgins-Biddle, 2003).

Table 2 reports MCO labor allocations for ongoing implementation by presenting the average time spent per patient and the average cost per minute for MCO staff in administering health appraisals, screenings and interventions for each MCO. Estimates reported in Table 2 are presented separately by clinic type (S or P). Time allocations for health appraisals and screenings represent the amount of time spent

TABLE 2. MCO labor allocations for health appraisal, screening and intervention (2001\$)

SBI activity	MCO site							
	Midwest		Northeast		West ^a		Southwest	
	S clinic	P clinic	S clinic	P clinic	S clinic	P clinic	S clinic	P clinic
Health appraisal								
Median minutes per patient	2 min.	1 min.	—	1 min.	4 min.	3 min.	1.75 min.	1 min.
Labor cost per minute	\$0.16	\$0.16	—	\$0.18	\$0.20	\$0.20	\$0.18	\$0.19
Total labor cost per patient	\$0.32	\$0.16	—	\$0.18	\$0.80	\$0.60	\$0.32	\$0.19
Screening								
Median minutes per patient	2 min.	2 min.	—	1 min.	0 min.	0 min.	2 min.	2 min.
Labor cost per minute	\$0.23	\$0.18	—	\$0.21	\$0.00	\$0.00	\$0.16	\$0.26
Total labor cost per patient	\$0.46	\$0.36	—	\$0.21	\$0.00	\$0.00	\$0.32	\$0.52
Intervention								
Median minutes per patient	5 min.	3 min.	—	4 min.	5 min.	2.5 min.	7 min.	4 min.
Labor cost per minute	\$0.32	\$0.82	—	\$0.85	\$0.43	\$0.99	\$0.36	\$0.94
Total labor cost per patient	\$1.60	\$2.46	—	\$3.40	\$2.15	\$2.48	\$2.52	\$3.76

^aBecause the West MCO used a computerized method of health appraisal and screening in which the patient was automatically prompted for screening upon scoring positive on the health appraisal, no additional time was required for administering the screen by MCO staff. As a result, the time spent completing both the health appraisal and screen is attributed to the health appraisal only. Labor costs for screening in the West MCO are therefore equal to \$0.

TABLE 3. Detailed ongoing implementation costs per patient by site and clinic type (2001\$)

SBI activity	MCO site								Median cost across MCOs	
	Midwest		Northeast		West ^a		Southwest			
	S clinic	P clinic	S clinic	P clinic	S clinic	P clinic	S clinic	P clinic		
Health appraisal (per patient completing the health appraisal)									S and P clinics combined ^b	
Labor	\$0.32	\$0.16	—	\$0.18	\$0.80	\$0.60	\$0.32	\$0.19	—	
Space	\$0.01	\$0.01	—	\$0.01	\$0.02	\$0.02	\$0.01	\$0.01	—	
Media	\$0.05	\$0.05	—	\$0.05	—	—	\$0.05	\$0.05	—	
Total health appraisal	\$0.38	\$0.22	—	\$0.24	\$0.82	\$0.62	\$0.38	\$0.25	\$0.25	
Screening costs (per patient screened)									S and P clinics combined ^b	
Labor	\$0.46	\$0.36	—	\$0.21	\$0.00	\$0.00	\$0.32	\$0.52	—	
Space	\$0.01	\$0.01	—	\$0.01	\$0.00	\$0.00	\$0.01	\$0.01	—	
Media	\$0.05	\$0.05	—	\$0.05	—	—	\$0.05	\$0.05	—	
Total screening	\$0.52	\$0.42	—	\$0.27	—	—	\$0.38	\$0.58	\$0.42	
Intervention costs (per patient receiving SBI)									S clinic	P clinic
Labor	\$1.60	\$2.46	—	\$3.40	\$2.15	\$2.48	\$2.52	\$3.76	—	—
Space	\$0.17	\$0.12	—	\$0.06	\$0.03	\$0.09	\$0.09	\$0.08	—	—
Media	\$0.41	\$0.41	—	\$0.41	\$0.41	\$0.41	\$0.41	\$0.41	—	—
Total intervention	\$2.18	\$2.99	—	\$3.87	\$2.59	\$2.98	\$3.02	\$4.25	\$2.59	\$3.43

^aBecause the West MCO used a computerized method of health appraisal and screening in which the patient was automatically prompted for screening upon scoring positive on the health appraisal, no additional MCO costs are incurred for screening. As a result, the cost for health appraisal and screening is attributed to health appraisal only. ^bMedian excludes the West MCO because appraisal and screening costs are combined at that site. See text for discussion as to why S and P clinics are combined for health appraisal and screening.

by MCO staff administering each appraisal or screening form, scoring the patient responses and presenting the completed form to the physician or specialist. Table 2 indicates that these activities were performed quickly by MCO staff, with health appraisals and screenings generally taking 1 to 2 minutes each. The table also indicates that the average time spent delivering interventions ranged from 2.5 to 7 minutes per patient. This result suggests that MCO staff were generally able to deliver the intervention according to Cutting Back protocol, which called for interventions of 3 to 5 minutes in length.

Cost estimates presented in Table 3 are reported separately by clinic type (S or P). Table 3 indicates that implementation costs per patient are dominated by the costs of delivering the intervention, which ranged from \$2.18 to \$4.25 across the study MCOs. For the Midwest, Northeast and Southwest MCO sites, health appraisal costs ranged from \$0.22 to \$0.38 per patient completing a health appraisal and are low relative to screening costs, which ranged from \$0.27 to \$0.58 per patient screened. The final column of Table 3 indicates that estimated median health appraisal and screening costs across all MCOs are \$0.25 and \$0.42 per patient appraised and screened, respectively. Median intervention costs across all MCOs are \$2.59 per patient receiving SBI in the S clinics and \$3.43 per patient receiving SBI in the P clinics. Differences between health ap-

praisal, screening and intervention costs per patient are the result of variations in average wage rates among the staff performing those activities. Health appraisals, for example, were typically performed by receptionists and are therefore the least costly, while interventions are the most costly because they took longer to perform and were performed by more expensive labor. Finally, implementation of SBI in the P model is more costly per patient screened and receiving an intervention than in the S model, partly because of the P model's use of more expensive physician labor.

Discussion

This article presents estimates of the costs of starting up and implementing SBI for risky drinking in a managed care setting. In addition to the cost estimates themselves, there are three key features that distinguish this report from others in the literature. First, we provide separate estimates of start-up costs—the costs associated with setting up and preparing for the implementation—and ongoing implementation costs of the intervention. Second, we include estimates of the costs of technical assistance required to start up and implement the interventions. As noted above, technical assistance costs account for a significant percentage of start-up costs. Third, we estimate and compare the costs of two alternative SBI implementation models (S and P).

Previous articles that have estimated SBI costs have provided estimates of implementation costs but have neglected the start-up cost component that is critical to the adoption and ultimate success of any real-world adoption of SBI or any other health-screening intervention. Public advocates of greater prevention interventions are often frustrated that simple, low-cost screening and other interventions are not implemented by MCOs and other health providers. However, one possible impediment to such prevention efforts may be the one-time cost associated with start-up and the costs of technical assistance required to implement an intervention. Although researchers may not have estimated these costs previously, MCOs presumably understand that considerable expenses must be incurred to start up a new intervention and change clinical practice and to assure that the implementation is being carried out consistently over time.

Regarding specific results, we find that start-up costs per MCO range from approximately \$86,000 to \$115,000. However, we can narrow this range considerably when we consider some of the unique aspects of two of these sites. First, the West site, which had the largest start-up costs, developed and programmed a computerized health appraisal and screening program. In addition, this site had the largest number of people trained, although the number of people who actually implemented SBI was substantially less than the number trained. If we eliminate equipment expenses and reduce the MCO labor-training costs and MCO other labor costs to the largest cost of the other sites, the West MCO's total start-up costs decrease from \$114,514 to \$85,033, which is more consistent with the Northeast and Southwest estimates. Second, the Midwest site, which had the second largest start-up costs, not only experienced difficulties in initiating the SBI program but also implemented SBI in two S clinics rather than one. Start-up difficulties and the costs of the additional S clinic are reflected in the Midwest site's higher technical assistance and other (nontraining) labor expenses relative to the Northeast and Southwest sites. If we reduce the Midwest MCO's other labor and technical assistance costs to the largest cost of the other sites, the Midwest MCO site's total start-up costs decrease from \$113,184 to \$95,173, which is more consistent with the Northeast and Southwest estimates.

We can fine-tune the start-up cost estimates further by examining start-up costs per clinic. Average total start-up costs per clinic in Table 1 range from approximately \$38,000 to \$88,000. But as we note above, the \$88,000 estimate was from an MCO that implemented the intervention in only one clinic. If MCOs were to implement this intervention at more than one clinic—a likely scenario—the start-up costs per clinic are in a very narrow range of \$38,000 (for three clinics) to \$43,000 (for two clinics and assuming we make the adjustments discussed above). The start-up costs per clinic would likely be even lower as a result of

economies of scale if an MCO were to start up the intervention in a larger number of clinics.

Start-up costs may be adjusted downward even further with careful interpretation of technical assistance cost estimates. Table 1 reports that technical assistance costs range from \$47,492 to \$75,567 per MCO site, but these costs are likely to be lower outside the research setting described here. SBI was implemented under the auspices of a research study focused on preserving the validity of the study design. As a result, substantial technical assistance was provided to ensure that the SBI process adhered as closely as possible to the study protocol. MCOs that implement the Cutting Back model of SBI in the real world would likely develop processes that economize on technical assistance costs.

Our study is unique in that we estimate and report the technical assistance costs associated with starting up the intervention. However, it is likely that start-up technical assistance costs would be lower, perhaps considerably so, if this intervention were implemented permanently by MCOs rather than temporarily as part of a research study. We speculate that additional technical assistance costs were incurred because this was a research study and MCO clinic staff may have been more resistant to a temporary change in their routine than if this intervention were implemented permanently by their MCO. Also, it is important to remember that start-up technical assistance and other start-up costs are not continuing costs—in contrast to the costs of SBI appraisal, screening and the intervention itself—but are one-time expenses that are incurred while honing the implementation phase of the intervention.

Our results also have important implications related to estimating space costs. Although other cost analyses (e.g., Bray et al., 1996; Zarkin et al., 2001) have shown space costs to be important, they constitute a very small proportion of total SBI costs. Space costs are a direct function of the amount of space used in SBI activities, the time spent in that space and the price of space. SBI requires a small amount of space and time to implement, which leads to low space costs. Moreover, our use of Class A suburban space cost represents an upper boundary on actual space costs. Our results therefore suggest that MCOs may safely ignore space costs in estimating the cost of SBI. However, we caution that our results may not generalize to all MCOs.

In terms of ongoing implementation, our results suggest that S clinics had lower implementation costs than P clinics. This fact, combined with preliminary outcome results that show that the S and P clinics produced similar reductions in alcohol consumption (Babor and Higgins-Biddle, 2003), makes the S clinic preferable to the P clinic for MCOs if cost-effectiveness is the determining factor. However, because of implementation issues discussed below, caution is advised on this conclusion.

Our study has some limitations. First, estimates of UCHC start-up technical assistance and other costs were based on

self-reports by individuals at UCHC on the time they spent performing each of these activities. Although best efforts were made to ensure the accuracy of these estimates, there are likely some errors. In addition, implementation of time estimates are based on the reports of a small number of individuals at each MCO, and these estimates are subject to measurement error, especially when estimating the time spent on short duration activities. Second, because each MCO's circumstances were different, each MCO (sometimes different clinics within MCOs) implemented slightly different versions of the SBI intervention (see Babor and Higgins-Biddle [2003] for a detailed discussion of implementation). This variability is common in community-based interventions and is less of a factor in a clinical trial setting in which tight controls can ensure strict adherence to the protocol. Implementation variability across the sites translates into differences in costs. In our discussion, we have noted some key differences and discussed how those differences affect costs. It is possible for S clinics to be more expensive than P clinics depending on implementation differences, such as the wages of staff delivering the intervention, the prevalence of risky drinking in the population and the degree to which the intervention is fully implemented for those who screen positive. Third, SBI is likely to increase recognition of alcohol dependence and thus the number of referrals to specialty care, which may affect short- and long-term MCO costs. These costs cannot be estimated because we did not follow patients referred to specialty care as a result of SBI (in our study, less than 1% of patients completing the AUDIT were severe enough to be referred to specialty care). Estimating the MCO costs of these SBI-related referrals is an important task for future research. A final limitation of our study is that MCOs were not randomly selected. Despite the geographic diversity of the study MCOs, nonrandom selection prevents us from generalizing our results beyond the MCOs examined here.

To help MCOs use our study results, we perform a policy analysis that will help them determine the costs of implementing SBI after training and other start-up costs are incurred. Consider an MCO with 100,000 members over 18 years of age in which 70% of all members make at least one visit to their primary care physician during the year. Assuming an appraisal cost of \$0.25 per patient, the MCO would incur \$17,500 per year for health appraisal ($0.25 \times 70,000$). If 10.7% of clients screened positive for risky drinking (the average positive screen rate in the four MCOs), the MCO would screen 7,490 patients per year and incur an additional \$3,146 per year for screening costs. If all 7,490 people received the intervention, the MCO would incur an additional \$19,399 if it used the S model (intervention cost of \$2.59 per patient) or \$25,691 if it used the P model (intervention cost of \$3.43 per patient). Thus, the estimated total cost of appraisal, screening and brief intervention for the hypothetical 100,000-member MCO is

\$40,045 per year for the S model, which translates into approximately \$0.40 per member per year or \$0.033 per member per month, and \$46,337 per year for the P model (\$6,292 more than the S model), \$0.46 per member per year or \$0.039 per member per month.

Acknowledgment

The authors thank Dan Kivlahan for his excellent comments on an earlier draft of this article.

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